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Benefits and challenges in cross media map production

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During the data collection for a new Alpine Club map covering Mt. Ushba (Gröbe et al. 2021; Gröbe et al. 2022) a workflow was built to create a web map and paper map preview of the map to visualize the current state of the project and check the data quality. It was necessary to locate, evaluate, and integrate the diverse sources such as the AW3D30, OpenStreetMap as well as scanned and georeferenced old maps properly into the project.

The creation of a GIS project and geo-database for storing the data was a first step. During this work, the need raised to share and remix the data for different purposes. Sharing the entire data set alongside the project files was infeasible due to the amount of data and the complexity of the data collection. The solution was the setup of a web map service to distribute the data in a standardized way and to have only one data collection for updates and backups.

For fulfilling the need for a preview of the print map and handy web map requires a sophisticated setup. A quick preview of the map without any waiting time needs a cache of prerendered data. The regular updates from OpenStreetMap result in the requirement to refresh the cache to always offer the newest version of data and map style. The solution should also enable the user to remix the data and use it in their preferred GIS software without binding to a specific software.

The solution uses the web mapping service (WMS) as a central endpoint to fulfil the needs in combination with different caches for tile services. Figure 1 shows the implemented solution. An extract from the OpenStreetMap database gets imported daily into the project's central database. The PostgreSQL database with the PostGIS extension for spatial data serves as central storage for all vector data and a local cache for the OpenStreetMap data, which is processed with SQL scripts for generalization. In addition, the scanned maps and raster data such as land cover and elevation model are stored as files. Everything gets distributed as WMS by the QGIS Server, which is configured by a QGIS project containing all needed information and the styling of the data.

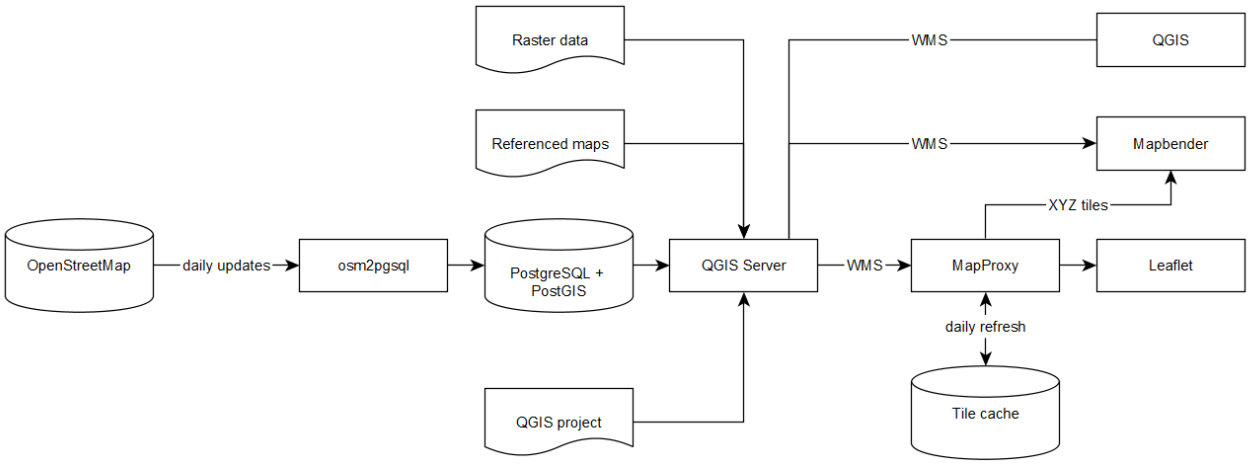

Figure 1. Workflow for the creation web and print map preview with daily updates from OpenStreetMap.

By using the WMS, it is possible for everyone with GIS, such as desktop GIS software like QGIS, to access the data and view it. Updates in the central database and the included data will be delivered immediately to all participants. Nevertheless, there is the disadvantage of a lacking performance of the services, due to long rendering time of the complex map style and in overview levels because the map is only prepared for one scale. However, the user expects not only to see the map at a fixed scale. As a solution, a caching of the map style, was introduced with the MapProxy with a tile service. Due to the daily updates from OpenStreetMap, a daily refresh of the cache is required.

The result could also be an WMS, but XYZ tiles as introduced by GoogleMaps are a more performant solution. A simple website containing a viewer like Leaflet can use this service to show the map immediately. It allows quick interactions

with the map. A drawback is, however, the fixed resolution of 96 dpi for screens, which does not always work well with font und symbol sizes. It can be difficult to read the font or labels are misplaced. Another disadvantage is, that there are only a few layers available and advanced GIS tools such as length measurements and adding layers are not available.

Therefore, the solution is to use the web GIS tool Mapbender, which satisfies such needs. It can also consume all other layers directly via the WMS, if required, and allow the creation of print previews regarding the final scale and resolution. In addition, also the cached layers can be used, or further services and files added, without using another software. Measurements can be done, for example, to plan further hikes for data collection.

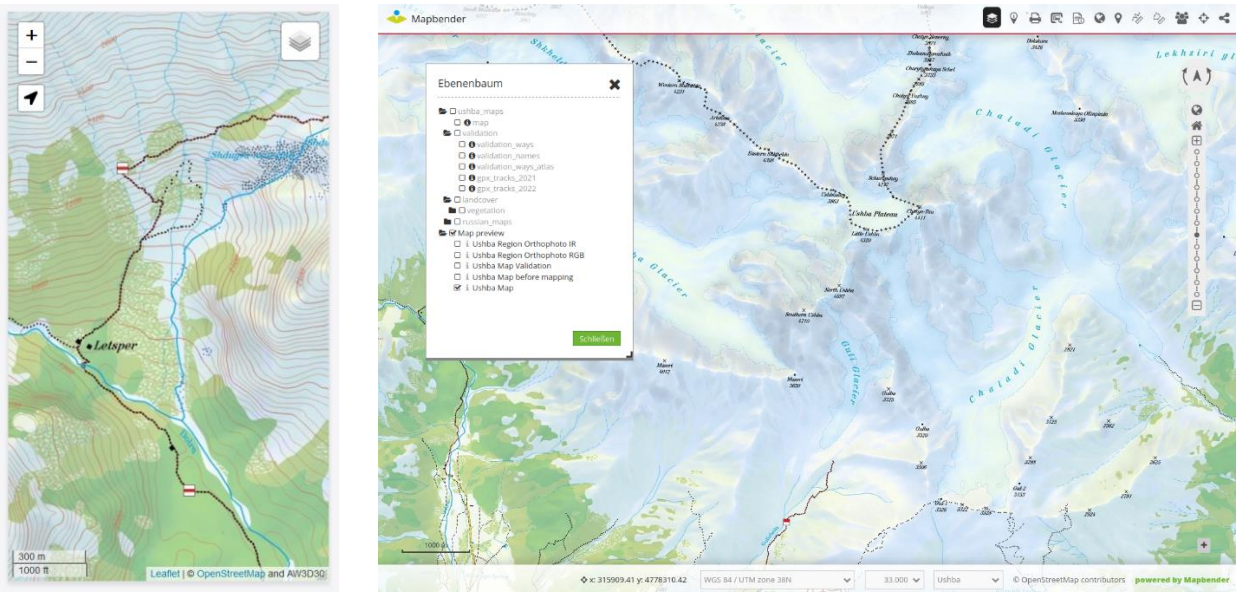

Figure 2. Web GIS solutions: Leaflet and Mapbender.

Nevertheless, the access needs to be limited to a dedicated user group. The solution is to utilize HTTP authentication to protect the WMS and the web-based viewers. A web server in front of all the microservices handles the authentication and redirects to the services itself.

Overall, a complex setup is necessary to provide quick and easy access to all participants of the mapping project, allowing daily updates and serving diverse needs from web map like preview to a preprint of the map. It allows instant feedback, tracking the progress of the project and showing the results to everyone, who contributed. The participants of the field campaigns found it motivating to see the progress directly and easy to check for errors. The key is to be flexible to the users' needs and offer a solution, which fulfils the specific needs.

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